Nozokomiyal Stenotrophomonas İnfeksiyonları

Dr Şirin Menekşe

Klimik 2023 Kongresi

Stenotrophomonas maltophilia

- Gr(-) non-fermenter basil
- Doğada yaygın
- Nozokomiyal enfeksiyon
- Düşük virülans
- Biyofilm özelliği

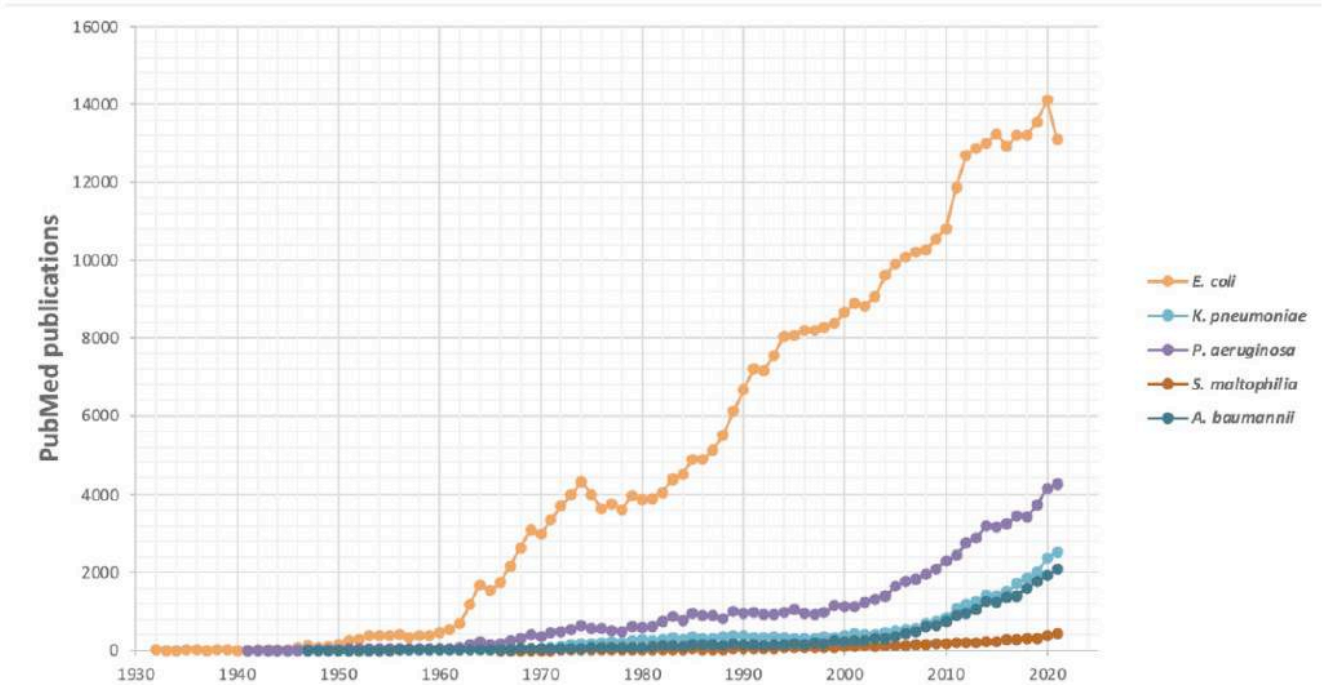


Figure 1. Timeline showing the total number of papers listed in PubMed per year about *E. coli*, *P. aeruginosa*, *Klebsiella pneumoniae*, *Acinetobacter baumannii* and *S. maltophilia*. Search terms used were: "Escherichia AND coli", "Pseudomonas AND aeruginosa", "Klebsiella AND pneumoniae", "Acinetobacter OR baumannii" and "Stenotrophomonas OR maltophilia".

Mojica MF, Humphries R, Lipuma JJ, et al. Clinical challenges treating Stenotrophomonas maltophilia infections: an update. JAC Antimicrob Resist. 2022;4(3)

- Kolonizayon- enfeksiyon ayrımı
- Tedavi seçimi
- AB duyarlılığı

- Genetik farklılık

- Endojen enfeksiyon?

- Antibiyotik baskısı?

Duan Z, Qin J, Liu Y, Li C, Ying C. Molecular epidemiology and risk factors of Stenotrophomonas maltophilia infections in a Chinese teaching hospital. *BMC Microbiol*. 2020;20(1):294. Published 2020 Sep 29. doi:10.1186/s12866-020-01985-3

Neela V, Rankouhi SZ, van Belkum A, Goering RV, Awang R. Stenotrophomonas maltophilia in Malaysia: molecular epidemiology and trimethoprim-sulfamethoxazole resistance. *Int J Infect Dis*. 2012;16(8):e603-e607. doi:10.1016/j.ijid.2012.04.004

TABLE 2 Sources of *S. maltophilia*

Setting	Reference(s)
Clinical/medical	
Hospital suction tubing	377
Electronic ventilator temp sensors, ventilator inspiratory/expiratory circuits	283
Central venous catheter	188, 228
Nebulizers	80
Endoscopes	179
Dental suction system hoses	250
Dental solid waste	347
Hemodialysis water and dialysate of renal units	15
Contaminated chlorhexidine-cetrimide disinfectant	369
Hand-washing soap	176
Irrigating solutions	4
Sink drains	39, 80, 81, 173
Faucets/faucet aerators, showerheads	80, 81, 173, 355, 363
Water fountain drains	40
Patients' medical charts	327
Cystic fibrosis patient cough-generated aerosols	351
Ice machine	85, 272
Tap water	15, 52, 80, 297, 316, 345
Water treated by filtration, reverse osmosis, UV exposure, or deionization	15
Microfiltered water dispensers	292

Brooke JS. Stenotrophomonas maltophilia: an emerging global opportunistic pathogen. Clin Microbiol Rev . 2012;25(1):2-41. doi:10.1128/CMR.00019-11

- 2019-2021 yılları
- Pandemi öncesi ve sonrası dönemde *S. maltophilia* izolatlarında fark yok

Hafiz, T.A.; Aldawood, E.; Albloshi, A.; Alghamdi, S.S.; Mubaraki, M.A.; Alyami, A.S.; Aldriwesh, M.G. *Stenotrophomonas maltophilia* Epidemiology, Resistance Characteristics, and Clinical Outcomes: Understanding of the Recent Three Years' Trends. *Microorganisms* **2022**, *10*, 2506

OPEN

Stenotrophomonas maltophilia pneumonia in critical COVID-19 patients

Marc Raad[1], Marc Abou Haidar[2], Racha Ibrahim[3], Rouba Rahal[1], Jocelyne Abou Jaoude[1], Carine Harmouche[1], Bassem Habr[1], Eliane Ayoub[2], Gebrayel Saliba[3], Ghassan Sleilaty[4], Karam Mounzer[5], Rindala Saliba[6] & Moussa Riachy[1]✉

- Mart 2020-2021, 123 kritik COVID-19 hastası
- 42 nozokomiyal pnömoni (%27.5%)
- S. maltophilia % 16.3

- Pnömomediastinum
- Alveoler hemoraji

ELSEVIER journal homepage: www.ajicjournal.org

Major Article

Colonization of the central venous catheter by *Stenotrophomonas maltophilia* in an ICU setting: An impending outbreak managed in time

Rimjhim Kanaujia MD [a,#], Anjishnujit Bandyopadhyay DM [b,#], Manisha Biswal MD [a], Neeru Sahni MD [b], Kulbeer Kaur PhD [a], Shashi Vig MSc [a], Vikas Sharma MD [a], Archana Angrup MD [a,*], Laxmi Narayana Yaddanapudi MD [b], Pallab Ray MD [a]

- Şubat 2020, Hindistan
- 5 santral kataterden alınan kan kültürü, 1 endotrakeal aspirat kültürü
- Aspirasyon için kullanılan solüsyon
- Kaynak uzaklaştırılması
- Santral kataterlerin erken çekilmesi

Major Article

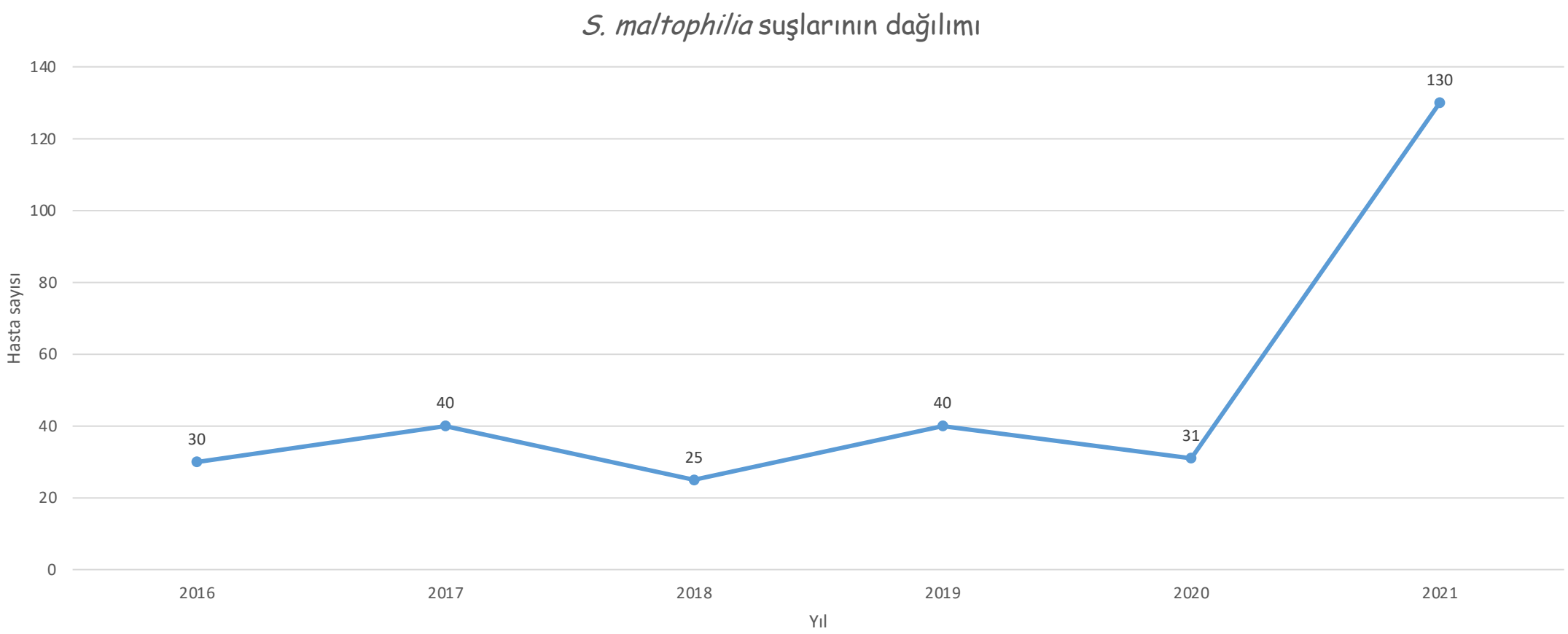
Stenotrophomonas maltophilia outbreak with a commercial blood gas injector as the culprit and interventions for source and prevention: A possible passage between patient and ECMO water heater device

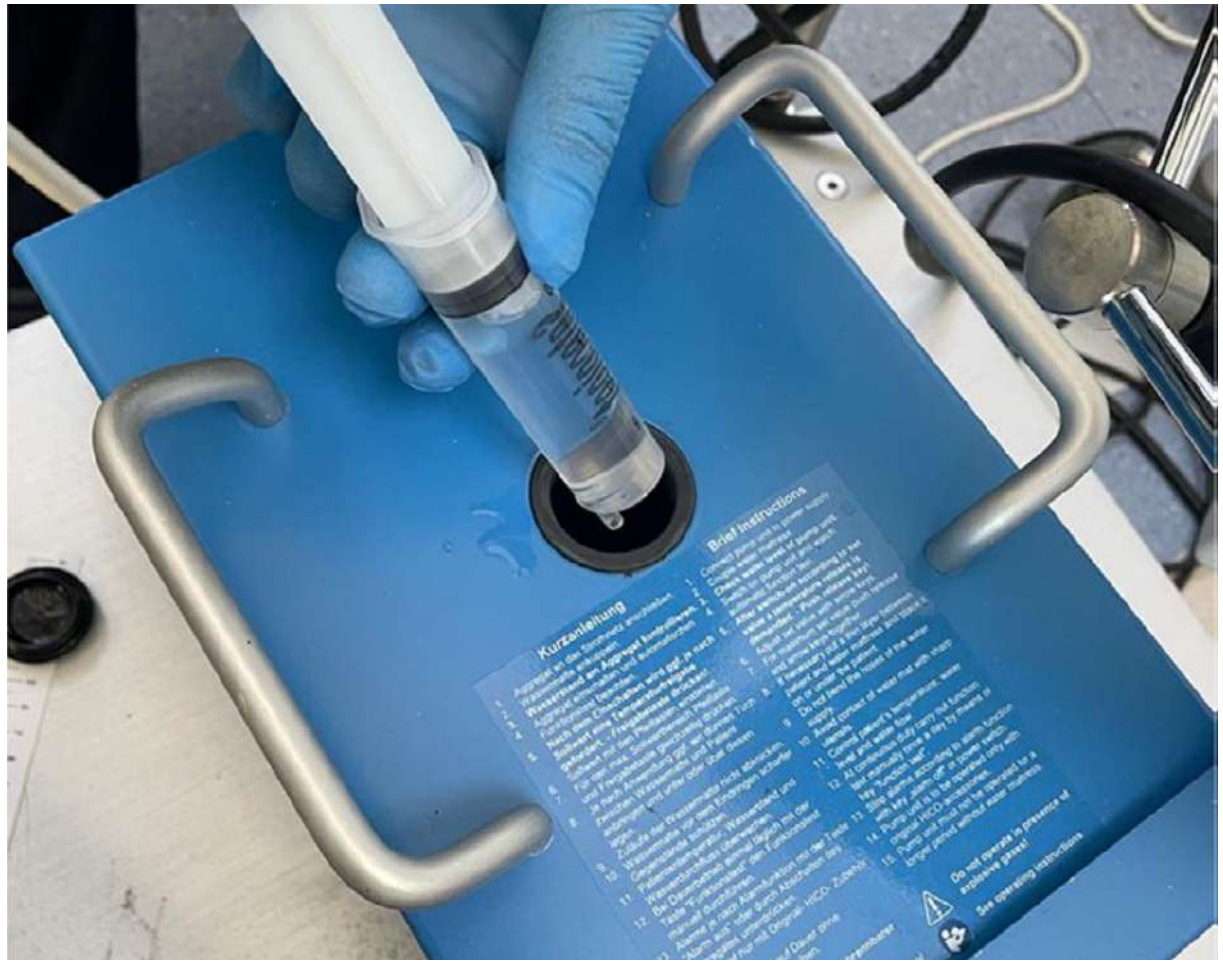
Şirin Menekşe MD [a,*], Elif Seren Tanrıverdi MD [b], Halide Oğuş MD [c], Ece Altınay MD [c], Çiğdem Kaya RN [a], Elif Çağlayan PhD [d], Arzu Ateşoğlu Aydoğan RN,MSc [a], Barış Otlu PhD [b], Mehmet Kaan Kırali MD [e]

- 1 Ocak-1 Aralık 2021
- Koşuyolu Yüksek İhtisas Eğitim Ve Araştırma Hastanesi
- 113 hasta

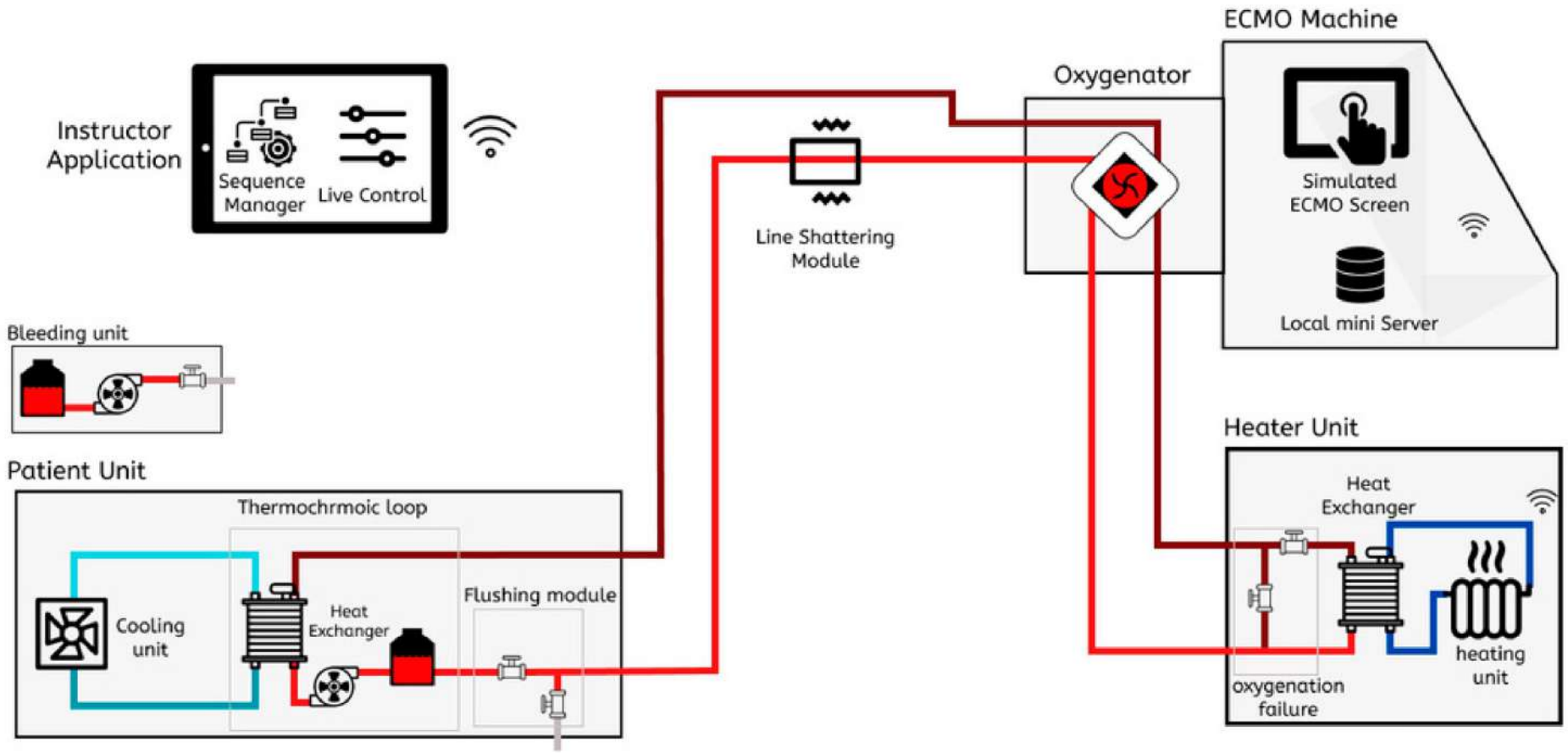
- 5-11 Ocak 2021, 3 hasta
- Salgın??
- Sürveyans çalışmaları
- Enfeksiyon kontrol önlemleri
- Kaynak taraması

Menekşe Ş, Tanrıverdi ES, Oğuş H, et al. Stenotrophomonas maltophilia outbreak with a commercial blood gas injector as the culprit and interventions for source and prevention: A possible passage between patient and ECMO water heater device. *Am J Infect Control*. 2022;S0196-6553(22)00537-5.


S. maltophilia suşlarının dağılımı
Hasta sayısı
140
120
100
80
60
40
20
0
30
40
25
40
31
130
2016
2017
2018
2019
2020
2021
Yıl



12.01.2021 ECMO ısıtıcı suyu


Instructor Application
Sequence Manager
Live Control
Line Shattering Module
Oxygenator
ECMO Machine
Simulated ECMO Screen
Local mini Server
Bleeding unit
Patient Unit
Thermochrmoic loop
Cooling unit
Heat Exchanger
Flushing module
Heater Unit
Heat Exchanger
heating unit
oxygenation failure


BRAKE

Microbial contamination of heater cooler units used in extracorporeal membrane oxygenation is not aerosolized into the environment: A single-center experience

Table 1. Organisms Cultured From Water Collected From All 3 ECMO Units

	ECMO Unit 1		ECMO Unit 2		ECMO Unit 3	
Organism	Culture	qPCR	Culture	qPCR	Culture	qPCR
Water sample (n=1)						
Ralstonia spp	Detected	. . .	Detected	. . .	Detected	. . .
Mycobacterium spp	Not detected	Not detected	Not detected	Detected	Not detected	Detected
Legionella spp	. . .	Detected	. . .	Not detected	. . .	Detected
L. pneumophila		Not detected		Not detected		Not detected
Air sample (n=4)						
Ralstonia spp	Not detected	. . .	Not detected	. . .	Not detected	. . .
Mycobacterium spp	Not detected	Not detected	Not detected	Not detected	Not detected	Not detected
Legionella spp		Not detected		Not detected		Detected
L. pneumophila	. . .	Not detected	. . .	Not detected	. . .	Detected

Note. ECMO, extracorporeal membrane oxygenation; qPCR, quantitative polymerase chain reaction.

Thomas S, Stevenson D, Otu AA, et al. Microbial contamination of heater cooler units used in extracorporeal membrane oxygenation is not aerosolized into the environment: A single-center experience. *Infect Control Hosp Epidemiol*. 2020;41(2):242-244.

Clin Infect Dis. 2022 Mar 10;ciac200. doi: 10.1093/cid/ciac200. Online ahead of print.

Cluster of Burkholderia cepacia Complex Infections Associated with Extracorporeal Membrane Oxygenation Water Heater Devices

Chanu Rhee [1 2], Meghan A Baker [1 2], Robert Tucker [1], Vineeta Vaidya [1], Meghan Holtzman [1], Raghu R Seethala [1], Maria Bentain-Melanson [1], Jesslyn Lenox [1], Adam R Smith [1], Jon C Boyer [1], Alison Gassett [1], Manfred Brigl [1], Mohamad Sater [3], Miriam Huntley [3], Ann E Woolley [1], Hilary J Goldberg [1], Karen Reilly [1], Andrew Resnick [1], Madelyn Pearson [1], Michael Klompas [1 2]

Abstract

Background: Burkholderia cepacia complex is a group of potential nosocomial pathogens often linked to contaminated water. We report on a cluster of 8 B.cepacia complex infections in cardiothoracic ICU patients attributed to contaminated ECMO water heaters.

Methods: In December 2020, we identified an increase in B.cepacia complex infections in the cardiothoracic ICU at Brigham and Women's Hospital. We sought commonalities, sequenced isolates, obtained environmental specimens, and enacted mitigation measures.

Results: Whole genome sequencing of 13 B.cepacia complex clinical specimens between November 2020-February 2021 identified 6 clonally related isolates, speciated as Burkholderia contaminans. All 6 occurred in patients on ECMO. Microbiology review identified two additional B.contaminans cases from June 2020, including one ECMO patient, that may have been cluster-related as well. All 8 definite/probable cluster cases required treatment; 3 died and 3 developed recurrent infections. After ECMO was identified as the major commonality, all 9 of the hospital's ECMO water heaters were cultured; all grew B.contaminans. Air sampling adjacent to the water heaters was culture-negative. Water heater touch screens were culture-positive for B.contaminans. The sink drain in the ECMO heater reprocessing room also grew clonal B.contaminans. Observations of reprocessing revealed opportunities for cross-contamination between devices via splash from the contaminated sink. The cluster was aborted by removing all water heaters from clinical service.

Conclusions: We identified a cluster of 8 B.cepacia complex infections associated with contaminated ECMO water heaters. This cluster underscores the potential risks associated with water-based ECMO heaters and, more broadly, water-based care for vulnerable patients.

Keywords: Burkholderia; Burkholderia cepacia; Extracorporeal Membrane Oxygenation; Nosocomial Infection; Water Heater Infection.

Nosocomial Transmission of *Cupriavidus pauculus* During Extracorporeal Membrane Oxygenation

S. H. Stovall,*† C. Wisdom,† W. McKamie,† W. Ware,† H. Dedman,† and R. T. Fiser*

Patients undergoing extracorporeal membrane oxygenation (ECMO) are at increased risk of infection. We present the first known report of nosocomial infection with *Cupriavidus pauculus* attributable to contamination from ECMO equipment and describe the measures taken to halt subsequent infections. A cluster of infections in ECMO patients should prompt team members to consider contamination of equipment with environmental pathogens as a possible cause. *ASAIO Journal*

Data were deidentified, and no communication with patients or families was attempted. The University of Arkansas for Medical Sciences Institutional Review Board classified this study as exempt.

Results

Case 1

Investigation of the outbreak by a multidisciplinary committee determined that multiple ECMO thermoregulator reservoirs (**Figure 1**) were contaminated with *C. pauculus*. The mechanism of patient infection was suspected to be through splashing of surfaces with contaminated water during manipulation of the reservoir and transmission from the ECMO specialist's gloves to the patient's blood when using blood ports of the ECMO circuit. The thermoregulator reservoir contains water used by the circuit's heat exchanger to rewarm the patient's blood. Without this mechanism, profound hypothermia would occur. At no time the is reservoir water in contact with blood in the circuit. The reservoir is filled with water before initiation of ECMO support, and the procedure required opening of the reservoir to check its water level every shift.

Ralstonia pickettii Bacteremia Associated With Pediatric Extracorporeal Membrane Oxygenation Therapy in a Canadian Hospital

Sarah Forgie, MD; Terri Kirkland, RN, CIC;
Robert Rennie, PhD; Linda Chui, PhD; Geoff Taylor, MD

We describe 2 pediatric patients with *Ralstonia pickettii* bacteremia associated with extracorporeal membrane oxygenation (ECMO) therapy. Investigation revealed a common environmental source—the ECMO temperature-control units. We created guidelines for disinfecting these units that do not void the manufacturer's warranty and have prevented additional cases of bacteremia due to this organism.

Infect Control Hosp Epidemiol 2007; 28:1016-1018

Clinical case 1. A male infant with trisomy 21 underwent cardiac surgery at 2 months of age. Two weeks after surgery, on November 30, 2003, the child sustained a cardiac arrest on the ward. Resuscitation was required, and ECMO therapy was initiated. After 15 minutes of ECMO treatment, blood was drawn for analysis from the venous port of the ECMO circuit. The white blood cell count was 2.1×10^9 cells/L (with 40% bands), and the platelet count was 4×10^9 platelets/L. Blood cultures grew *Enterococcus* species and *R. pickettii,* and treatment with tobramycin, piperacillin-tazobactam, and vancomycin was initiated. The patient's condition deteriorated over the next 48 hours, and just prior to ECMO discontinuation, blood cultures again grew *R. pickettii.* Both isolates were resistant to amikacin, aztreonam, ceftazidime, gentamicin, imipenem, meropenem, ticarcillin-clavulanate, and tobramycin and susceptible to trimethoprim-sulfamethoxazole and ciprofloxacin.

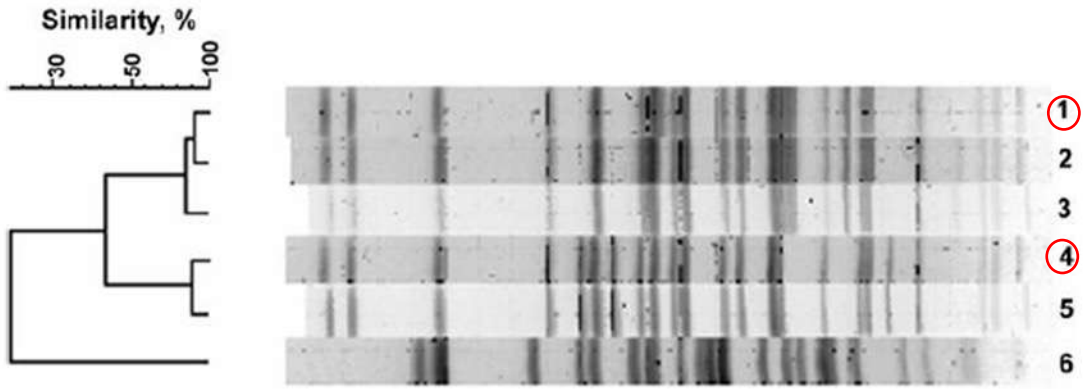
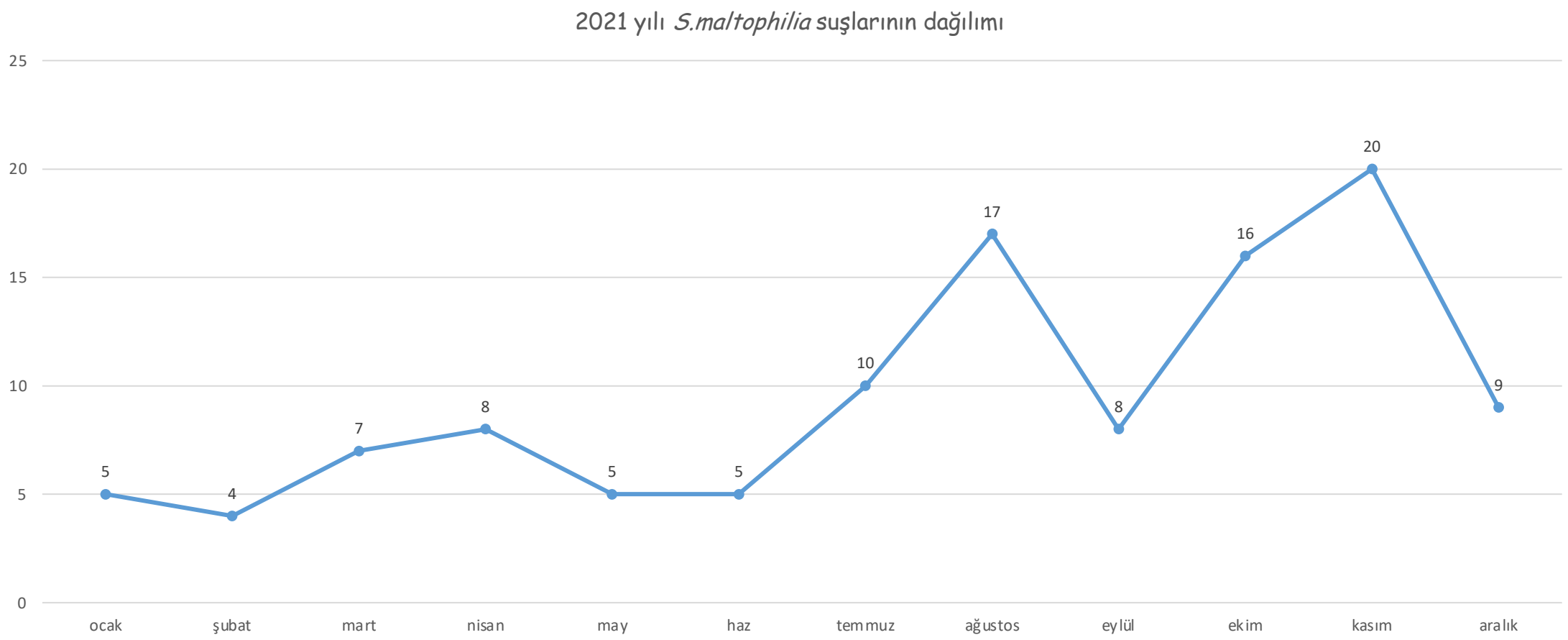


FIGURE. Pulsed-field gel electrophoresis patterns of *Ralstonia pickettii* isolates recovered at Stollery Children's Hospital in Edmonton, Canada. *Lane 1,* isolate 2 from the infant in clinical case 1; *lane 2,* isolate from the infant in clinical case 2; *lane 3,* isolate from extracorporeal membrane oxygenation (ECMO) circuit 1; *lane 4,* isolate 1 from the infant in clinical case 1; *lane 5,* isolate from ECMO circuit 2; and *lane 6,* isolate from an adult.


2021 yılı S.maltophilia suşlarının dağılımı
25
20
15
10
5
0
5
4
7
8
5
5
10
17
8
16
20
9
ocak
şubat
mart
nisan
may
haz
temmuz
ağustos
eylül
ekim
kasım
aralık

08.12.2021 - Denetim Hizmetleri Başkan Yardımcılığı

Ayset Tıbbi Ürünler ve Plastik Tekstil Elektronik Gıda Ten. Mad. İnş. Müc. San. A.Ş. firması tarafından piyasaya arz edilen, "8697427700429 barkod numaralı Ayset marka 3 Parçalı Conzol, Siyah İğneli (0,70x32) 2 Ml Kan Gazı Şırıngası" isimli ürünlerin inceleme ve analiz işlemleri tamamlanıncaya kadar tedbir amaçlı piyasaya arzı, piyasada bulundurulması, önerilmesi veya teşhir edilmesi durdurulmuş olup ayrıca ürünün Kurumumuz Ürün Takip Sistemi'nde ürün hareketlerinin kısıtlanmasına karar verilmiştir. Bu kapsamda ürünün belirtilen barkodunun mevcut bulunduğu sağlık kuruluşlarında kullanımının durdurulması önem arz etmektedir. İlgili sağlık meslek mensuplarına önemle duyurulur.

- 113 hasta, 133 klinik örnek
- 89 kan,
- 40 solunum yolu
- 2 idrar
- 2 yara
- 10 ECMO ısıtıcı suyu, 23 örnek
- Klinik örnek+ ECMO ıstıcı suyu: 5 hasta

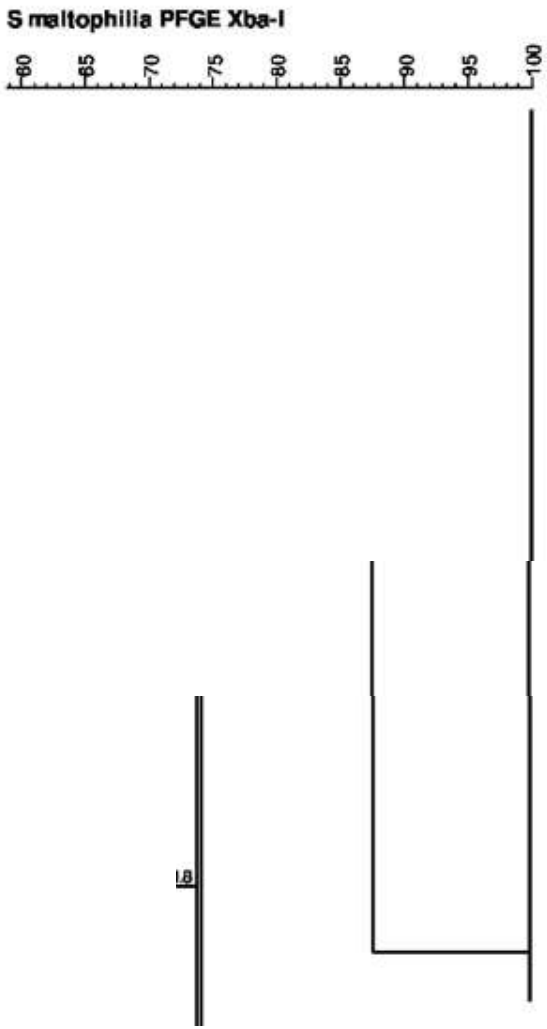
PFGE

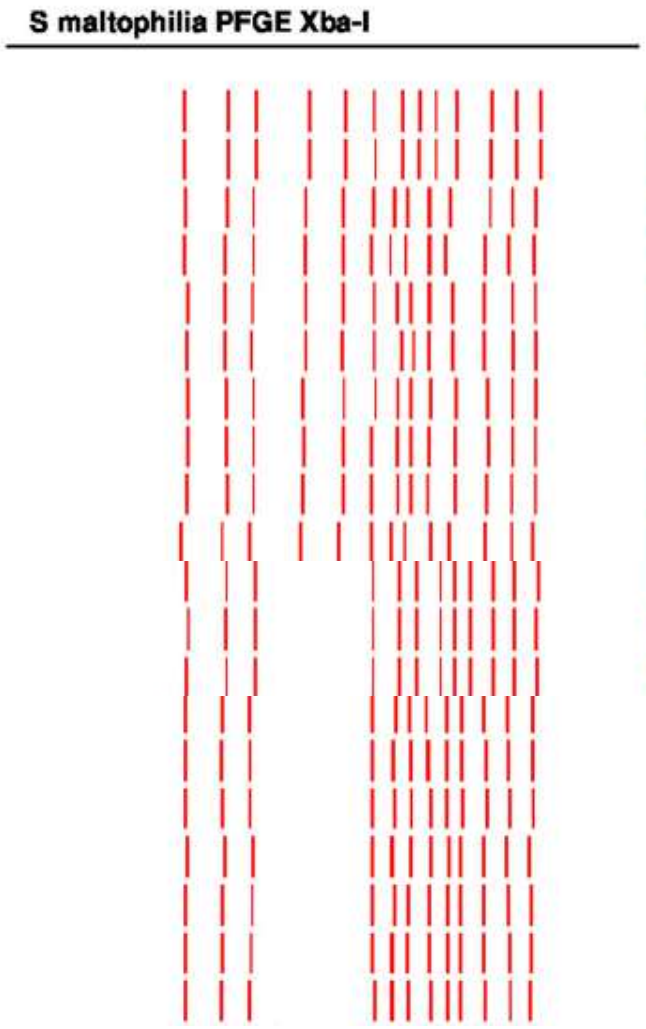
- 67 izolat:
- 59 klinik
- 4 ECMO ısıtıcı suyu
- 4 kan gazı enjektörü

12 farklı genotip, 3 kümeleşme

52 izolat aynı genotip (%77.6)

- 4 kan gazı enjektörü
- 46 klinik örnek
- 2 ECMO ısıtıcı suyu





Isolate no	Unit	Isolation date	Specimen	Genotype
21	Pediatric cardiac ICU	25.06.2021	Endotracheal aspirate	1
66	Pediatric cardiac ICU	03.10.2021	Blood	1
73	Pediatric cardiac ICU	16.10.2021	Blood	1
76	Cardiovascular surgery ICU	23.10.2021	Blood	1
80	Pediatric cardiac ICU	30.10.2021	Blood	1
81	Coronary ICU	30.10.2021	Blood	1
84	Cardiovascular surgery ICU	01.11.2021	Blood	1
85	Pediatric cardiac ICU	03.11.2021	Blood	1
86	Pediatric cardiac ICU	03.11.2021	Blood	1
87	Cardiovascular surgery ICU	09.11.2021	Ecmo	1
64	Cardiovascular surgery ICU	04.10.2021	Blood	1b
113	Cardiovascular surgery ICU	14.12.2021	Injector	1b
114	Cardiovascular surgery ICU	15.12.2021	Injector	1b
99	Pediatric cardiac ICU	22.11.2021	Blood	1b
102	Coronary ICU	28.11.2021	Blood	1b
103	Pediatric cardiac ICU	28.11.2021	Blood	1b
105	Cardiovascular surgery ICU	29.11.2021	Endotracheal aspirate	1b
107	Cardiovascular surgery ICU	06.12.2021	Blood	1b
108	Pediatric cardiac ICU	10.12.2021	Ecmo	1b
15	Cardiovascular surgery ICU	27.03.2021	Blood	1b

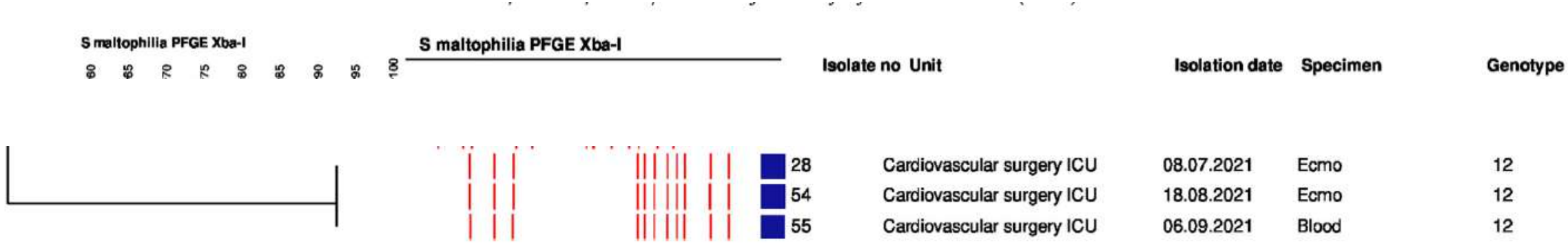


Fig 3. Pulsed-field gel electrophoresis results of 67 *S. maltophilia* isolates.

Does marking as sterile mean really sterile? Stenotrophomonas maltophilia outbreak caused by blood gas injector containing liquid heparin

- 01.04-08.12-2021, Hacettepe Üniversitesi Hastanesi
- Dahiliye Yoğun Bakım ve Anestezi Reanimasyon
- 98 hasta, 134 kan kültür izolat
- %24 mortalite

Telli Dizman G, Metan G, Karahan G, et al. Does marking as sterile mean really sterile? Stenotrophomonas maltophilia outbreak caused by a blood-gas injector containing liquid heparin [published online ahead of print, 2023 Feb 13]. Infect Control Hosp Epidemiol. 2023;1-3.

Table.1 Incidence densitiy rate of *S. malthopilia* bloodstream infections

	January-March 2021	April May 2021	June July 2021	August September 2021	October November 2021	December2021-April 2022
Hospital-wide	0.29 (0.1556-0.5272)	0.86 (0.5634-1.316)	0.08 (0.02281-0.3033)	0.47 (0.2698-0.8241)	1.9 (1.444-2.508)	0.19 (0.1034 - 0.3315)
AR-ICU	2.93 (1.14-7.51)	3.09 (1.051-9.044)	2.27 (0.4013-12.76)	10.37 (5.465-19.59)	19.43 (12.47-30.14)	1.96 (0.6684 - 5.76)
IM-ICU	0.96 (0.2624-3.481)	4.08 (1.977-8.396)	1.1 (0.1947-6.218)	0.77 (0.1358-4.344)	6.64 (3.371-13.06)	0.91 (0.3108 - 2.683)
ER	1.87 (0.5123-6.783)	3.02 (1.029-8.853)	0	0	8.21 (4.168-16.12)	0.4 (0.07093-2.272)

/1000 patient day (%95 Confidence Interval)
AR-ICU: Anesthesiology and Reanimation Intensive care unit
IM-ICU: Internal Medicine Intensive care unit
ER: Emergency Room

Telli Dizman G, Metan G, Karahan G, et al. Does marking as sterile mean really sterile? Stenotrophomonas maltophilia outbreak caused by a blood-gas injector containing liquid heparin [published online ahead of print, 2023 Feb 13]. Infect Control Hosp Epidemiol. 2023;1-3.